DOCUMENT RESUME

ED 234 742 IR 010 808

AUTHOR Oliver, Marvin E.
TITLE Computer Literacy for Teachers: Level 1.
PUB DATE 25 Jul 83
NOTE 19p.
PUB TYPE Guides - Classroom Use - Guides (For Teachers) (052)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Computer Assisted Instruction; *Computer Literacy; Computer Managed Instruction; Computer Programs; Definitions; Higher Education; History; Input Output Devices; Instructional Materials; *Microcomputers; Reading Instruction; *Teacher Education
IDENTIFIERS *Computer Uses in Education

ABSTRACT

This brief, non-technical narrative for teachers addresses the following questions: (1) What are computers? (2) How do they work? (3) What can they do? (4) Why should we care? (5) What do they have to do with reading instruction? and (6) What is the future of computers for teachers and students? Specific topics discussed include the development of computers, the status of microcomputers, how to communicate with a computer, removing the mystery from computer talk, using the microcomputer for instruction, managing instruction with a microcomputer, and software selection and construction. Definitions are provided for such terms as hardware, system, peripherals, disk-drives, Disk Operation System, and software. Three references are listed. (LMM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
■ This document has been reproduced as received from the person or organization originating it.
□ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

ED234742

COMPUTER LITERACY FOR TEACHERS: LEVEL1

by

Marvin E. Oliver
EASTERN WASHINGTON UNIVERSITY
Department of Education

Submitted July 25, 1983

IR010808

Marvin E. Oliver
Professor of Education
Eastern Washington University
Cheney, Washington 99004

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Marvin E. Oliver
TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

COMPUTER LITERACY FOR TEACHERS: LEVEL 1

You've known about computers for a long time. They use them at the bank to keep records of accounts; airlines use them to record reservations and to program up-to-date rate information; large corporations use them for accounting; and researchers use them for data analysis. Small personal appliance computers are accumulating in small businesses, homes, and schools. Microcomputers are even being offered for sale in department stores right along with videogames and stereos. The 1983 International Reading Association Convention emphasized the use of computers in reading instruction and many of the publishers exhibited computer software right along with their textbooks. Unlike our teeth, computers will not go away if we ignore them. They are here to stay. America seems to be in a state of transition from an industrial society to an informational society. According to Dr. Andrew Molnar, with the National Science Foundation (1981), more than half of America's jobs are in the information industry. Because computers are so efficient at handling information they are becoming a basic tool. So now when the critics of education encourage us to return to the basics, we must reconsider what is basic.

Perhaps you already know something about computers. It is also very likely that there will be at

least one student in your class, if you are a teacher of children above fourth grade, that will be more computer literate than you are.

What are computers? How do they work? What can they do? Why should we care? What do they have to do with reading instruction? What is the future of computers for teachers and students? The answers to these questions constitute the first level of computer literacy. Programming is the main part of computer literacy but that can be learned as an advanced level of usefulness.

We are privileged to be on the threshold of an exciting new technological advancement. Microcomputers will provide us with a tool that can make our teaching and record keeping more efficient than we could have dreamed possible a few years ago. University professors of education and school teachers and administrators are rushing to catch up with the children in their use of computers.

Development of Computers

The first electronic computer was developed before many of you were even born. Computers have been around a long time. It's just that few of us actually were

exposed to those early computers back in 1945. They had so many vacuum tubes that special buildings had to be designed to house them. Their weight and the weight of the air conditioning units needed to cool them required specially reinforced floors and elaborate ventilation systems. It was not only expensive to house these first electronic computers but also very expensive to operate them. It took electricity to run the air conditioners and to activate the thousands of vacuum tubes. Vacuum tubes burned out and had to be replaced.

The development of transistors and printed circuits made computers inexpensive enough for large airlines and banks, universities, and school systems to purchase them. By 1968 large computers were accessed from terminals so that many students could use the same computer. The eight-bit microprocessor chip was constructed in 1976. This tiny silicon chip, smaller than your fingernail, contains more than 20,000 transistors. The microprocessor chip is the electronic "brain" of the computer.

What are Microcomputers?

Today's microcomputers are small, lightweight, and inexpensive. They are affordable and portable. Some are

lighter than a typewriter and can be purchased for less than $1,000. Dr. Osborne offers a microcomputer that looks like a small suitcase when the keyboard is folded up. Microcomputers are being purchased in increasing numbers for schools and homes. Over a half a million have already been sold and half of those have been to schools. Three-fourths of the microcomputers sold to schools have been placed in high schools. Some units look like keyboards that connect to a television set or a monitor called a Cathode Ray Tube (CRT). Others, like the Radio Shack TRS-80 Model III and Model 4, have the keyboard and the CRT in one unit along with the disk drives for playing records. The records are called floppy diskettes, in computerese, and what is played is called a disk operating system and programs that have been recorded on the diskettes. Microcomputers can be connected to printers that will type letters, address labels, write checks, or print Language-Experience stories. An examination of a software catalog will reveal some amazing functions of microcomputers.

The Status of Microcomputers

University courses in computer programming have

become so popular that many students are disappointed to find computer classes closed at registration. Many schools are offering workshops in computer programming. The status of microcomputers in schools is changing so rapidly that a description of how many have been sold changes almost as frequently as the sign under the golden arches. A glance at your local magazine stand will reveal a large number of new computer journals. There is TEACHING AND COMPUTERS, ELECTRONIC LEARNING, COMPUTERS READING and LANGUAGE ARTS, ENTER, PERSONAL COMPUTING, POPULAR COMPUTING, CREATIVE COMPUTING, DESKTOP COMPUTING, ELECTRONIC EDUCATION, 80 MICRO, and several others for specific computer systems. There are many new books coming out on the use of the computer. Computer centers and software stores are opening in almost every city. More and more classrooms are being equipped with computers every day.

How to Communicate with a Computer

Computers operate on a binary system. They store information in their memory chips based on combinations of zeros and ones. Zeros and ones are determined by high and low voltage. Each zero and each one that the computer remembers is called a bit. A string of bits

is combined to form a byte. The most common byte size is the eight-bit byte that combines zeros and ones to represent keyboard strokes. Eight cells of memory are used up with every stroke of the keyboard. The letter K is used to represent 1,024 bytes. In order to do any serious programming or use some of the best programs available, a microcomputer really needs a minimum of 48K of memory. Memory is important because it limits the usefulness of the system.

The computer has neither emotions nor intelligence. Although scientists are developing the biochip which is produced by bacteria, those microcomputers available today are made completely of inorganic material, except for a little plastic or rubber. In other words, today's computers are not alive. It can be comforting to realize that you are more intelligent than a computer, even when it's plugged in. Somehow, what we type in from the keyboard must be converted into combinations of zeros and ones. Most computers have Random Access Memory (RAM) for user programming, and Read Only Memory (ROM). Some RAM is used up by the operating system so that it is not all available to the user. The ROM is preprogrammed to hold the language to which the computer responds. ROM

is like long-term memory and is built into the system to stay. RAM is like short-term memory and is erased when the power goes off. Programs can be stored on an external memory tape or disk. An ordinary audio cassette tape can record computer programs but is much less efficient than disk storage.

The first computers had to be programmed in machine language using combinations of zeros and ones. Now, computer manufacturers have agreed to assign unique combinations of zeros and ones to letters of the alphabet, numerals, and other symbols found on the keyboard. This electronic code is called ASCII (az-kee). Languages have been developed to act as interpreters between English and the language of the computer. FORTRAN is an acronym for FORmula TRANslation for mathematical operations. Computer users in business have a language called COBAL which is an acronym for COmmon Business Oriented Language. The most common data processing language in use for educational purposes is the Beginners All-purpose Symbolic Instruction Code (BASIC).

Authoring systems have been developed so that computer programs can be made up without any background of programming experience. Authoring Languages, such as

PILOT, can be purchased as software. Documentation, for PILOT, explains how to create your own Computer Assisted Instruction (CAI) lessons. Prompts are displayed on the screen to explain what kind of input the computer program expects of you or to give you some other information to make the program friendly, that is, easy to use. Authoring systems are meant to make the computer useable without knowing a language such as BASIC. In the special vocabulary of computer language, the term friendliness means to make computers easy to use with a minimum of knowledge and skill.

In order to learn to program, you must get your hands on a computer and do some programming. What is learned from the books is valuable but is only tentative until your program is run.

Not everyone has the special aptitude nor the desire to become an expert computer programer. But with just one good course in BASIC and few hours of practice at the keyboard, a teacher can learn enough about the limitations and the capabilities of a computer to use it to advantage in the classroom.

Removing the Mystery from Computer Talk

It is easy to feel left out of any subject if you

don't know the meaning of the special vocabulary. Beginning teachers often feel left out in teacher's meetings until they learn what all those abbreviations and acronyms mean. There is IRA, NCTE, NEA, IRI, FTE, IEP, IRP, HIP, SSR, and ITA and TO used to be popular. A teacher is truly a person of letters. And just when we thought we were literate, we are faced now with a whole new set of terms. Some teachers are excited about learning to use computers; others feel threatened. Some people fear that computers may take over the world if we don't stop them. Have no fear. Computers are only tools that can help teachers do their job. Here are some terms that you may hear or read from the specialized vocabulary of computers:

Hardware refers to the computers themselves along with other equipment such as printers that make up the system.

The System is the keyboard, the display screen (CRT) and all the other hardware that is connected together for use by the computer.

Peripherals are the units of hardware that are connected to the computer such as a printer, or a cassette tape recorder.

Disk drives are little boxes with slots and doors. They are connected to the computer so that you can play records called hard disks or floppy diskettes. Hard disks are usually eight inches in diameter while the most popular diskettes are 5+ 1/4 inches. The disks with programs on them include a Disk Operating System (DOS) that contains a program to help the computer execute commands.

Software refers to the disks and the programs on them. Software is usually only useable on a specific operating system which means that it is not compatible with other computers. You can't use an Apple program on a TRS-80 unless the program was stored on an operating system that is common to both computers. The CP/M operating system is available in some Apple and some TRS-80 micocomputers. Programs are available to make compatible conversions..

You will hear many tradenames for specific brands of computers. Some of the most popular microcomputers in schools are the TRS-80, made by Radio Shack, the Apple, the TI 99/4, the Atari, IBM, and the Vic Commodore. There are several other computers too, but

they are not as commonly used in the schools as the ones mentioned here.

Schools can purchase software for specific computers that will tutor children in math, spelling, dictionary skills, social studies, reading skills, word processing, or anything else in the curriculum that is appropriate for Computer Assisted Instruction (CAI). As more and better software is developed for CAI, teachers will discover that the microcomputer can help with much of their work so that they are free to teach what isn't taught by CAI. Even with a computer, children will need supervision by the teacher and someone to answer their questions about, "What am I supposed to do now teacher? I don't understand the prompt."

Using the Microcomputer for Instruction

Most children seem to be interested in reading the words that light up on the CRT. If they are doing any programming, children have an extra incentive to read because they must follow the instructions and proofread their own statements and commands. The computer can be a tremendous help to the teacher in managing and individualizing instruction with tutorial programs, drill and practice, and simulation.

One of the greatest and most immediate values of the microcomputer is to use it as a word processor for recording young children's dictation of Language-Experience (LEA) stories. Bradley(1982) reported that first grade children were highly motivated to dictate LEA stories to their teachers when they could see their words displayed on the screen. They wrote longer stories than would usually be expected. Receiving immediate printouts of their stories prompted unsolicited reading by these first-graders.

Barber(1982) found the microcomputer useful for helping his first-graders manipulate language and develop an increased understanding of the structure of written language. Of course, as soon as children learn how to spell enough words, they can type their own LEA stories with simplified word processing programs that are available for children to use now.

Word processing provides an ease of writing that could be expected to encourage children to write. In order to use computers efficiently, children will need to learn keyboard skills. Computer word processing may influence teachers to emphasize more writing in future language arts classes. Programming requires a precise sequence of statements and commands in order to get the

computer to do what is wanted. Such precision in communication could be expected to impose a structure on the programmer's thinking and communication skills.

Another great value of the microcomputer as a device for learning could be its use by the student in cross ability tutoring. The student who understands a process or has knowledge could help a student who lacks such understanding or knowledge. In tutoring another, one must know the lesson that is to be taught with a deeper and a broader understanding than is necessary for one's own use. In other words, in order to teach another, one must develop awareness of the cognitive processes involved in learning. In order to program a computer to tutor another, the tutorial programmer will learn the lesson to a greater depth and breadth than is necessary for the tutee to master.

A word processing program makes typing so efficient that the teacher may enjoy typing stories at adjusted readability levels for children who are frustrated with the readability level in the books.

Tutorial CAI programs are designed to present some information and then ask comprehension questions. They are based on the same format as programmed learning but have the advantage of responding to each question and

branching to appropriate areas for the individual.

Drill and practice lessons can easily be put into a computer program also. They can be useful for providing practice on skills that have already been presented. Videogame-like techniques can be used to increase motivation to participate in instructional activities on the microcomputer.

Managing Instruction with a Microcomputer

The great challenge of teaching is to meet individual needs. The microcomputer can help teachers diagnose student needs. It is capable of administering, correcting, and recording criterion-referenced tests, and mastery tests. Student progress can easily be recorded using a computer. Programs can be purchased or constructed to compute and print student grades. Managing instruction with a computer is commonly referred to as Computer Managed Instruction (CMI).

Software Selection and Construction

There have been several articles in national magazines lately advising consumers which microcomputer to buy. The best microcomputer to buy depends upon how much money you can invest and what software you want to

use. Purchase the microcomputer that will operate the software. The software documentation will indicate what kind of a computer system you need. Where do you find the software that you need? Software companies advertise in computer magazines and professional journals. Buy a computer magazine and send for catalogs. Browse through a software store. Buying software can be risky. If it is protected by copyright, it may be illegal to duplicate it. Large companies will usually guarantee their software. Some, such as Radio Shack, will permit or even encourage you to duplicate, or backup, their software. The original may be kept in a safe place while you use only the backup copy. It is important to purchase only software that has been validated. Validated software has been tested to determine that it will do what it is intended to do without the user having to debug it so that will operate properly.

As more teachers design software, there will be more useful programs available. But software production lags behind hardware development. A computer without a program is like a stereo without a record to play on it. In order to develop your own programs, you need to understand what the computer is capable of doing. One

course in BASIC language can show you what the computer can and cannot do. But learning BASIC is not necessary in order to write your own programs. You can start with an authoring language, such as PILOT, that will simplify the development of instructional programs for the teacher.

Designing an instructional program begins much the same as lesson planning. When you know the age and ability of the students, the microcomputer to be used, and how long the lessons are to be, you determine the specific learning objectives. Analyze the importance, learning level, prerequisite skills required, and the difficulty level of each task. Then frames are developed for what will be on the display. The author must determine what responses will be acceptable in answer to questions and how the computer is to respond to the learner's input. Some frames will merely give information, some will ask questions and encourage repeated attempts to get the correct answer. Keep in mind, though, that it takes the experts about 100 hours of intense work for each hour of a program. The commercial software designers operate in teams, with each member contributing for a particular area of expertise. Don't feel bad if you aren't motivated to

produce your own software. Just get your hands on a computer and use some of the educational programs that are available.

REFERENCES

Barber,B. Creating BYTES of language. Language Arts, 1982,59, 472-475.

Bradley,V. Improving student's writing with microcomputers. Language Arts, 1982,59, 732-733.

Molnar,R. The challenge of the 1980's: Computer literacy, Educational Computer, February, 1981, in Microcomputers in education: Getting started,Proceedings of the Ninth Annual Math/Science Conference, 1981,2,2-13.